VC102 Kit
Installing a Volume Control
In the
GT-102 Power Amplifier

Revision 2p01 July 31, 2020

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Section 1: About This Manual

This manual is about the VC102 Kit. The VC102 Kit supplies the parts you need to install a volume control into the GT-102 Stereo Power Amplifier. This manual gives the information you need to:

- Drill the chassis to accept the volume control and
- Wire in the volume control.

Tools and Supplies You'll Need

You'll need the following tools and supplies:

1. Phillips screw driver
2. Masking tape, duct tape, and electrical tape
3. A drill, and various drill bits (5/16" and some smaller bits to start the hole)
4. needle nose pliers, wire cutters, and strippers
5. pencil type soldering iron of 25 to 50 Watts and 60/40 rosin core solder
6. a utility knife to help prepare the shielded cable
7. Magnifying glass, if you're over 42!

By purchasing, using, or assembling this kit, you have agreed to hold AkitikA, LLC harmless for any injuries you may receive in its assembly and/or use. To prevent injuries:

- Wear safety glasses when soldering to prevent eye injuries.
- Always unplug the power before working on the amplifier.
- Large capacitors hold lots of energy for a long time. Before you put your hands into the amplifier:
    - Pull the AC plug!
    - Wait 1 full minute for the capacitors to discharge!
- Remove jewelry and rings from your hands and wrists, or anything that might dangle into the amplifier.
- If working in the amplifier, keep one hand in your pocket, especially if you're near the power supply or power supply wires. This can prevent serious shocks.
- Build with a buddy nearby. If you've ignored all the previous advice, they can dial 911 or get you to the hospital.

Before You Begin

Remove the AC power cord from the IEC power connector on the GT-102 and from the wall outlet. Disconnect the GT-102 from your sound system. Allow the capacitors in the amplifier one full minute to discharge before beginning installation.

After the minute has elapsed, remove the 11 Phillips head screws that hold the cover in place and put them in a safe place. Remove the cover and set it aside in a safe place.

Section 2: Installing the Kit

Dealing with Metal Shavings

Installing the volume control requires that you drill a hole in the front panel of the GT-102. If you're installing the volume control into an already built GT-102, then you must be very careful that the metal shavings resulting from drilling the hole don't short out the electronics already installed in the enclosure. We'll show some ways to avoid problems with metal shavings shortly.

The best time to make the hole for the volume control is before you've installed any electronics in the chassis. It's then easy to clean up the metal shavings without any special tools or precautions. No matter when the hole is drilled, the metal shavings must be removed.

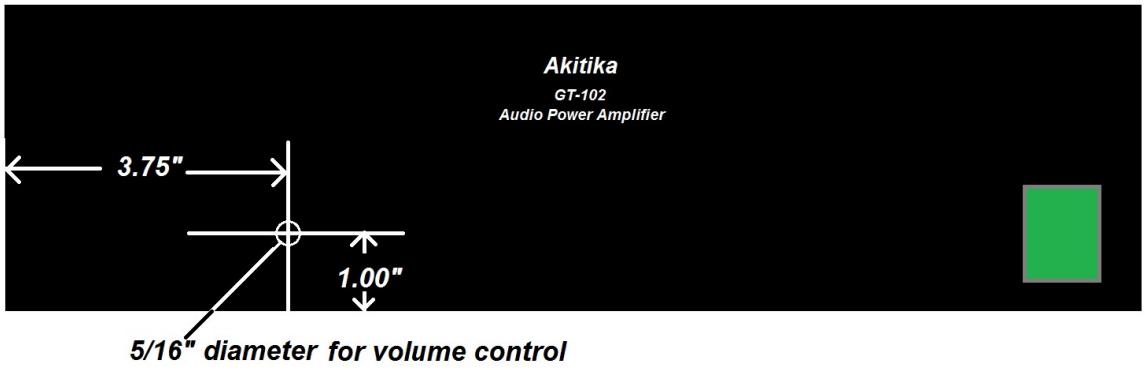


Figure 1 – Location of the Volume Control hole

Locating the hole

Figure 1 shows the hole placement. To locate the hole without damaging the paint, we recommend that you measure the rough position of where the hole will go, then cover the location with a piece of painter's masking tape. Now you can accurately measure and mark the hole location on the masking tape with a pen or pencil. This protects the finish from damage.

Make a catch basin out of duct tape. You'll place this catch basin on the inside of the chassis front wall, behind where the hole will be drilled. The purpose of the duct-tape catch-basin is to catch the metal filings before they can get away from you. This is particularly important if the amp is already built. It's not quite so important if you're putting the hole in an empty chassis. In either case, your goal is to end up with no stray metal chips in the chassis.

To accurately locate the hole, use a spring-loaded center-punch, If you don't have one, a nail and a tap of a hammer will mark an indentation to guide your drill bit.

Start with a small drill and make a small hole, say 1/16". Change to a 1/8" drill and enlarge the hole. Before making the hole any larger, make sure that the chassis is secured. Change to a ¼" drill and enlarge the hole again. Don't press too hard. Let the drill do the

work. ***Taking it easy will prevent you from damaging the chassis, or yourself, or turning the chassis into a propeller, or poking big holes in the duct-tape catch basin.*** Finally, drill the hole out to the finished 5/16" diameter.

Remove the duct-tape catch basin. If you "smush" it against the inside of the chassis front wall, you may find it catches most of the metal shavings. De-burr the edges of the hole. Remove the masking tape that you used to mark the hole location.

When to Install the Volume Control

We recommend that you assemble and test the amp in the normal fashion before you install the volume control. That will allow you to separate problems that might arise during amplifier assembly from problems that might arise during volume control installation.

Pre-wiring the Volume Control

Prepare two lengths of shielded cable[1]:

- A 7.5" length for the right channel, and
- A 12" length for the left channel

Use the directions in the Appendix.

Make sure to reserve the removed outer insulation, as you'll use this to insulate the drain wire of the shielded cable. Figure 2 shows the connections.

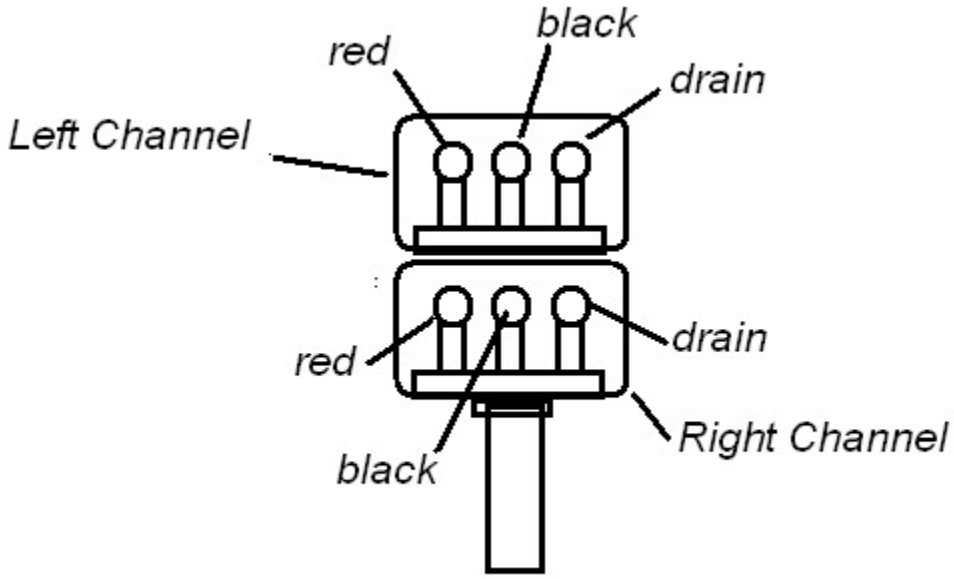


Figure 2-Connection Diagram for shielded cable

Figure 3 shows an example of the completed assembly at the volume control end.

[1] I've made these lengths somewhat longer than necessary to make it easy to remove a module if troubleshooting is necessary.

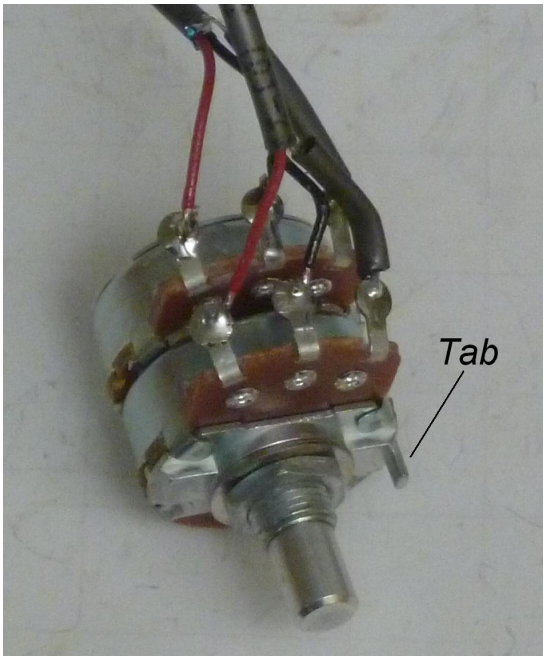


Figure 3-Connect the shielded cables to the volume control. Remember to remove the tab

Please take a minute to review the appendix. Once the stripped ends have been tinned, we recommend a J-bend in the end of the wire. Crimp the lead to make a good mechanical connection to the eyelet, and solder the wires to the eyelets.

Install the Volume Control

Once you've attached the shielded cables to the volume control, remove the locating tab (see Figure 3) from the volume control using needle nose pliers. Install the volume control in the front panel as shown in Figure 5. Turn it on its side, as shown, with the center lug a bit below the center-line of the mounting hole.

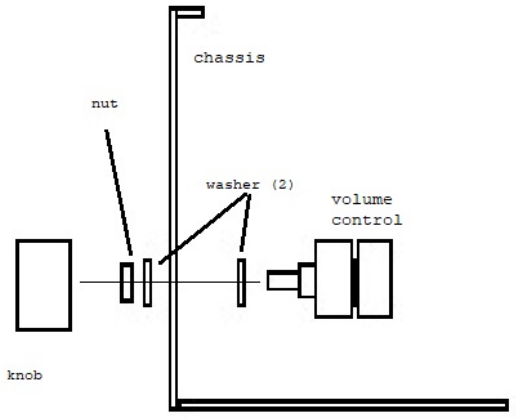


Figure 4-installing the volume control and mounting hardware

It's best if you have a nut driver to tighten the nut, although you can use pliers if you're careful not to let them slip and scratch the front panel. Once the volume control is installed and tightened, turn the shaft fully counterclockwise (viewed from the front panel).

Loosen the set screw on the knob using the supplied 2 mm allen wrench. Then slip the knob over the volume control shaft. Set the indicator to 7 o'clock and tighten the set screw.

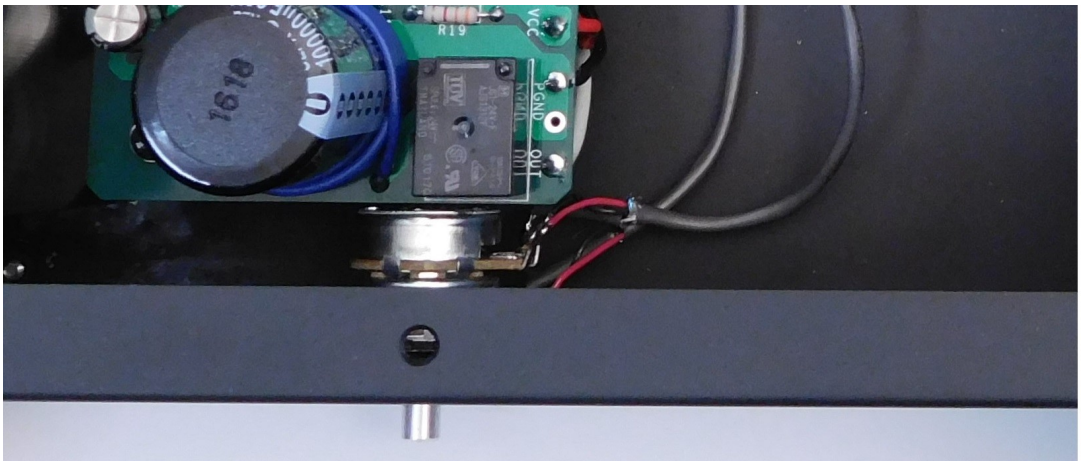


Figure 5-Locating the volume control

Removing the Amplifier Boards

The GT-102 has been designed so the amplifier boards can be easily removed. Doing so may make some of this assembly much easier. To remove the boards:

- Use a #2 Philips screwdriver to remove the two 6-32x1/4" sems screws that hold the PCB to the mounting brackets.
- Use a stubby #2 Philips screwdriver to remove the one 6-32x3/8" sems screw that holds the LM3886 to the heat sink. With a little care, you can avoid getting thermal compound over everything.

Removing Wires and Clearing Holes

In the next section you will remove some of the existing wires, then clear the holes to accept new wires. Here are some hints:

1. It may be easier to remove the amplifier boards before you try to remove or install the wires.
2. Heat the component side of the board and use tweezers or needle nose pliers to remove the wire from the eyelet(s).
3. Use the "toothpick trick" to clear the holes if you don't have nice de-soldering equipment. Get a wooden toothpick with a sharp point ready. Then, heat the hole you're about to clear, and push the toothpick into the hole to clear the solder. Wait a few beats before pulling the toothpick out. You'll now have a clear hole to install the new wire into.

Connecting the shielded cables

This process will be done twice, once for the right channel, and once for the left.

1. Solder the drain wire from the volume control shielded cable to the unpopulated INGND hole on the PCB. Cover the drain wire using a bit of the gray jacket from the shielded cable.
2. Unsolder the existing red wire from the PCB IN terminal.

3. Twist and solder the just disconnected red wire to the red wire from the volume control shielded cable. Wrap the connection with a piece of electrical tape.
4. Solder the black wire from the volume control shielded cable to the IN terminal of the PCB.

Repeat the above process for the other channel.

Final Assembly

Check your work for the absence of solder bridges and the presence of good connections. Reinstall the top and the 11 screws that hold it in place.

Specifications and a Usage Note

The input impedance of the amplifier with the volume control will be about 10 K Ohms. This is lower than the typical power amplifier's input impedance (around 50 K Ohms). Still, it's high enough not to cause a problem with 99.49% of existing equipment.

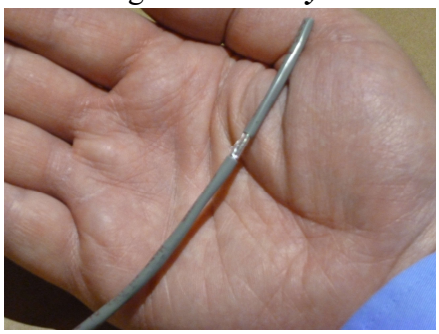
Installing the volume control in the GT-102 enables direct connection of a CD player, or other high-level output device, directly to the GT-102. Doing so minimizes the amount of electronics between you and the sound, maximizing the potential fidelity of your system.

Appendix 1: Preparing a shielded cable end

This section tells how to prepare the ends of the shielded cable. This process will be repeated four times, at both ends of both cables (although the cables will have different overall lengths).

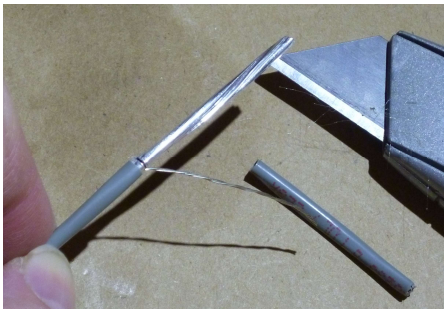
1. Cut the shielded cable to the overall required length.
2. Use a utility knife with a new, sharp blade to cut the plastic jacket of the shielded cable 1" back from the end. Hold the blade perpendicular to the cable, and draw it across the cable lightly as you rotate the cable along its long dimension. This creates a scored line through the plastic jacket. With a sharp blade, not much pressure is needed. You may need a bit of practice to get the feel.

3. If you've scored the jacket carefully, you can separate the jacket at the score line without using tools. Pull the insulating jacket off, exposing the cable, showing the foil shield, the drain wire, and the fuzzy string. The result is shown here, with the foil shield showing. ***Make sure you save the gray insulating jacket for later use.***

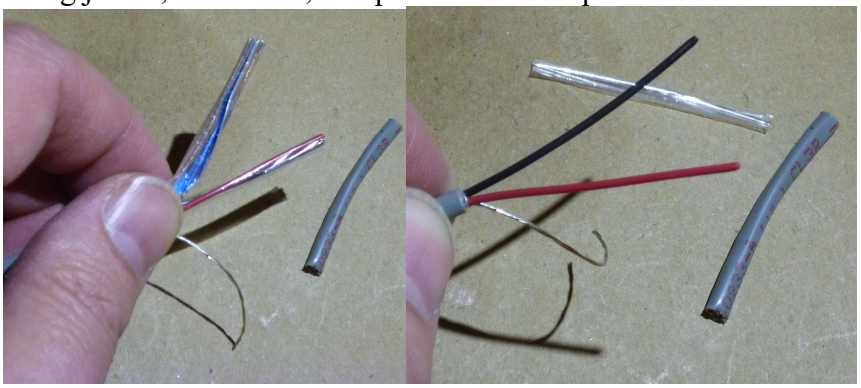


4. Cut off the fuzzy string.

5. Separate and twist the drain wire.



6. Peel back and remove the foil. Remove the plastic wrap from the red and black wires. The drain (bare wire), red, and black wires are exposed now that gray insulating jacket, foil shield, and plastic over-wrap have been removed.



7. Remove 3/8” of insulation from the red and black wires. Keeping the three wires separate, tightly twist the strands of the black, red, and drain wires. Tin the ends of the three wires.
8. Cut about 3/8” off the length of the gray insulating jacket you saved from step 3.
9. Slip the insulation from the previous step over the drain wire. This should leave 3/8” of bare drain wire exposed. That leaves enough bare conductor to make connections, but prevents inadvertent short circuits as you complete assembly.
10. Repeat the end preparation process for the other ends of the shielded cables.